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Engineering

Vol. IX. JUNE, 1914. Part 1.

Transactions of the Mining and Geological Institute of India.

Edited by
The Honorary Treasurer.

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Volume XLII, 1912.

Part 1.—Survival of Miocene Oyster in Recent Seas. Silurian Fossils from Kashmir. Blodite from Salt Range. Gold-bearing Deposits of Mong Long, Hsipaw State, Northern Shan States, Burma. Steatite Deposits, Idar State. Miscellaneous Notes.

Part 2.—General Report for 1911. Dicotyledonous Leaves from Coal Measures of Assam. Poting Glacier, Kumaon, Himalaya, June 1911. Miscellaneous Notes.

Part 3.—Mineral Production of India during 1911. Kodurite Series.

Part 4.—Geological Reconnaissance through Dihong Valley, being Geological Results of Abor Expedition, 1911-12. Traverse Across the Naga Hills of Assam. Indian Aërolites. Miscellaneous Notes.

Volume XLIII, 1913.

Part 1.—General Report for 1912. Garnet as a Geological Barometer. Wolframite in Tavoy District, Lower Burma Miscellaneous Notes.

Part 2.—Mineral Production of India during 1912. Notes on the Relationship of the Himalaya to the Indo-Gangetic Plain and the Indian Peninsula. Note on a Twinned Crystal of Hambergite from Kashmir.

Part 3.—Contributions to the Geology of the Province of Yunnan in Western China: I. Bhamo-Têng-Yüeh Area. II. Petrology of Volcanic Rocks of Têng-Yüeh District. The Kirana Hills. Banswal aërolite.

Part 4.—Gold-bearing Alluvium of Chindwin River and Tributaries. Correlations of Siwaliks with Mammal Horizons of Europe. Contributions to the Geology of the Province of Yunnan in Western China: III. Stratigraphy of Ordovician and Silurian Beds of Western Yunnan, with provisional Palaeontological Determinations. Notes on "Camarocrinus Asiaticus."

Application for any of the above should be made to The Head Clerk, Geological Survey of India, 27, Chowringhee, Calcutta.

Transactions
# of the
Mining and Geological Institute of India.

Part I.] 1914. [June.

Annual Meeting.

Held on Friday, January 30th, 1914.

The Eighth Annual General Meeting of the Institute was held in the Lecture Room of the Asiatic Society of Bengal, 1 Park Street, Calcutta, on Friday, the 30th January, 1914, at 11 a.m.

Present:—Messrs. A. S. Thomson, President (in the Chair), G. F. Adams, Thos. Adamson, E. C. Agabeg, F. J. Agabeg, C. T Ambler, P. H. Ashcroft, A. G. Bennertz, E. S. Bennertz, A. C. Bannerjee, R. J. Browne, P. Brühl, N. M. Chaudhuri, R. F. Campbell, L. M. Chaudhuri, H. M. Daly, C. J. E. David, G George, T. S. Gibson, H. G. Graves, W. J. Greener, A. H. Higby, B. Heaton, S. Heslop, Lieut.-Col. F Cunynghame Hughes, Messrs. L. A. Jacobs, J. S. Kean, Hon'ble Mr. W. A. Lee, Messrs. H. Lancaster, A. M. Lamb, G. C. Leach, C. J. G. Loveband, C. H. McCale, Jas. Mackintosh, S. McMurtrie, F. T. Marley, N. N. Mukherji, A. G. Mackay, J. G. Maughan, F. Owen, W. H. Phillips, R. Purdy, B. K. Ray, W. J. Rees, H. H. Reynolds, E. H. Roberton, H. M. Tarlton, J. J. Turnbull (Jr.), A. Houstone Ward, J. B. Wardlaw, Thos. Walsh, T. P. Yeoman.

Mr. H. H. Reynolds, Honorary Secretary, read the notice convening the meeting.

The Chairman appointed Messrs. C. T. Ambler and E. C. Agabeg as scrutineers to scrutinize the result of the voting for Officers and other Members of Council for 1914.

He then read the minutes of the Seventh Annual General Meeting of the Institute for the year 1913, which were adopted unanimously.

The Chairman then read the minutes of the Ordinary General Meeting held at Asansol. The minutes having been unanimously adopted, were signed by the Chairman.

The Honorary Secretary then read the following Report:—

REPORT OF COUNCIL.

The Council have the honour to present the Eighth Annual Report on the working of the Mining and Geological Institute of India.

2. The number of Ordinary Members at the close of the year was 249, being the same as at the close of the previous year. During the year 17 new members were elected, but as three of them have not yet paid their entrance fees the actual number of joining members was 14. During the year the Institute lost 14 members as follows:—Resignation 4, death 1, and struck off (under Rule 14) 9.

Of Associate Members of the Institute two were elected during the year and one resigned, so the net increase over the previous year is one only.

Two Associates and two Subscribers have joined during the year.

The following table gives the numbers for the last five years:—

	1909.	1910.	1911.	1912.	1913.
Ordinary Members	233	251	247	249	249
Associate Members ..	19	17	17	15	16
Associates	9	7	5	6	8
Honorary Members	10	11	10	10	10
Subscribers	10	18	20	23	25

3. The following list gives the names and addresses of those who have joined the Institute during the year 1913.

Ordinary Members.

1. Ashcroft, Chas. E., Mining Engineer, Holder of 1st Class Mine Managers' Certificate under British Coal Mines Act. M.I.M.E., F.G.S., Soodee Coal Co., Sitarampore.
2. Bullock, J., Holder of 1st Class Mine Managers' Certificate, Shampore Colliery, Nirshachetty P.O., E.I.R.
3. Burt, W., Colliery Manager, Lakurka Colliery, Katrasgarh, E.I.R.
4. Crofton, Chas. A., Holder of 1st Class Mine Managers' Certificate under British Coal Mines Act. M.Inst. M.E., Kantapahari Bungalow, Panuria P.O., *viâ* Sitarampore.
5. Daly, H. M., Colliery Manager, Joba Colliery, Joba P.O., *viâ* Kalipahari, E.I.R.
6. Davies, H. J., F.G.S., Geologist to the Burma Oil Co., Ld. C/o Messrs. Finlay, Fleming & Co., P.O. Box 181, Rangoon.
7. Fairhurst, G. H., General Manager, The Bengal Iron & Steel Works, Kulti, E.I.R.
8. Gibson, E., Mining Engineer. Jumoni Coal Co., Madhuband Colliery, Nowagurh P.O., Manbhum.
9. Henderson, G. L. B., Mining Engineer. Holder of 1st Class Mine Managers' Certificate. Mine Manager, Damuda Coal Co., Ld., Barmondia Colliery, Sitarampore, E I.R.
10. Loveband, C. J. G., Colliery Manager, Dishergarh Colliery, Dishergarh P.O., *viâ* Sitarampore, E.I.R.
11. Ray, B. K., Holder of 1st Class Colliery Managers' Certificate

under the Indian Mines Act. Colliery Manager, Messrs. R. B. Sircar & Sons' Kirkend Colliery, Kirkend P.O., Manbhum.

12. Sarcar, S. N., Colliery Manager, Nega Valley Colliery, Kalipahari, E.I.R.

13. Marley, F. T., Mining Engineer. Holder of 1st Class Mine Managers' Certificate under British Coal Mines Act. M.I.M.E. Chichuria Colliery, Chora P.O., *viâ* Ukhara, E I.R.

14. Lancaster, H., Holder of 1st Class Mine Managers' Certificate. Lutchipore Colliery, Sitarampore, E.I.R.

Associate Members.

1. Gould, L., Manager, Firebrick & Pottery Works, Kumardubi House, Barakar, E.I.R.

2. Robertson, I. G. C., Colliery Manager, Holder of 2nd class Mine Managers' Certificate. Salanpore Colliery, Sitarampore, E.I.R.

Associates.

1. Boisogomoff, J., Colliery Proprietor, 57, Radha Bazar Street, Calcutta.

2. Mukherjee, B. K., Coal Merchant and Colliery Proprietor, 1, Swallow Lane, Calcutta.

Subscribers.

1. Graham & Co., Managing Agents, Coal Companies, 9, Clive Street, Calcutta.

2. Mitsui Bussan Kaisha, Ld., Commercial Firm. Telephone Buildings, Home Street, P.O. Box 14, Bombay.

4. Five members have resigned :—Messrs. H. Brown, Thos. Emmerson, A. Gillespie, H. C. Veasey, and R. G. Wells. The following names have been removed from the list of members under Rule 14 of the Articles of Association :—Messrs. H. J. L. Belletti, C.S. Fawcitt, H. Herklots,

J. G. Herriotts, H. E. Judd, E. Kelly, A. Mervyn-Smith, L. Munn, J. W. Nierses and G. N. A. Pitt.

5. Meetings of the Institute were held as follows :—

Ordinary General Meeting, Saltore, 6th January, 1913.
Annual General Meeting, Calcutta, 31st January, 1913.
Ordinary General Meeting, Kalimati, 29th September, 1913.
,, ,, ,, Asansol, 3rd November, 1913.

By the kind invitation of Messrs. Bird & Co., Managing Agents, the Saltore Coal Co., Ld., an excursion was made to visit the Saltore Coal Mine, where an aerial ropeway has been erected for the purpose of conveying coal cheaply and quickly to the railway. The meeting at Kalimati was held by the kind invitation of the Tata Iron & Steel Co., Ld., to visit their works at Sakchi. The meeting at Asansol was arranged to be held on the 11th August, 1913, but had to be postponed, it having been found impracticable on the part of most of the members residing in the Bengal Coalfields to attend the meeting, owing to breaches in railway lines. The meeting was therefore held on November 3rd.

6. At the Annual General Meeting, the President delivered the Presidential Address, and at this and the subsequent meetings, the following papers were read and discussed :—

(*a*) Labour in Bengal Coal Mines. By E. C. Agabeg, F.G.S.
(*b*) Transport and Screening of Coal at Saltore Colliery. By E. S. Tarlton.
(*c*) The Kent Coalfield; its Geology and Exploitation. By Lieut.-Col. F. Cunynghame Hughes, M.I.M.M., F.G.S.

7. Four parts of the Transactions have been issued, forming parts 2, 3 and 4, Vol. VII, and part 1, Vol. VIII. Vol. VII, part 2, was issued on 5th April; Vol. VII, part 3,

on the 22nd October; Vol. VII, part 4, on the 24th November; and Vol. VIII, part 1, on 30th December, 1913.

8. Seven Council meetings have been held during the year for election of members and transaction of the current business of the Institute.

9. There were no meetings of the Raniganj Map Committee during 1913.

The maps were being reproduced in the Bengal Drawing Office and were expected to be out during the year; but owing to the unusually wet monsoon, which has added to the difficulties of the colour-printing, there has been a greater delay than was anticipated. They are expected to be ready towards the end of February, 1914.

10. On Mr. R. R. Simpson, Honorary Secretary, proceeding on leave, the Honorary Secretaryship of the Jharia Map Committee was retaken over by Mr. R. G. M. Bathgate.

A Surveyor has been appointed, and he, during the past year, has been surveying the various seams, from No. 7 to No. 15, where they outcrop, between Katras on the one side and Bhulanbararee on the other side of the field; the total amount of actual measuring having amounted to slightly over one hundred miles in length.

11. *Local Meetings.* At the Asansol Branch, two meetings have been called for the discussion of papers read at the various meetings of the Institute, viz. one on the 20th March and the other on the 4th June, 1913. The latter proved abortive on account of the heavy and early rains and had to be indefinitely postponed.

At the Jharia Centre, only one meeting has been held on the 27th March, 1913, at which the various papers read before the Institute were discussed. A field day was held on the afternoon of February 24th, when several members attended and examined the geological features of a portion of the field lying around the boundaries of Bhowra and Jorapokhur. Messrs. Adamson and Browne accompanied the members and pointed out the position of the different seams, and effects of the large amount of faulting which has occurred in the above neighbourhood. Another field day was held on the 1st December, 1913, when the members present under the guidance of the President of the Institute, examined the outcrops of the lower seams extending from Lodna Colliery towards Bustacolla, which proved very interesting.

12. Several valuable books on technical subjects have been added to the library during the year, and a catalogue of library books has been prepared and the rules printed.

13. A small committee has been formed to investigate the question of subsidence in the Bengal Coalfields ; viz. Mr. Glen George (Chairman), Messrs. R. G. M. Bathgate, J. S. Kean, P. S. Keelan, F. Owen, A. B. Hughes (representative of the Bengal Nagpur Railway Company). Mr. G. F. Adams has kindly consented to act as Honorary Secretary of the above Committee. The Indian Mining Association, the East Indian Railway Company and the Bengal Nagpur Railway Company have each agreed to annually contribute Rs. 600 for three years.

14. The prize offered by the Government of India for the best paper read before the Institute was divided equally between Messrs. A. Mort and E. C. Agabeg for their respective papers on "Coal Mining at Khost, Baluchistan," and "Labour in Bengal Coal Mines."

15. The following is the financial statement for the year 1913. The revenue of the Institute for 1913 is

Rs. 10,047-15-7, the expenditure Rs. 8,759-1-9, leaving a balance of Rs. 1,288-13-10. In addition Rs. 510, the realization of entrance fees, has been credited to Capital.

MINING AND GEOLOGICAL INSTITUTE OF INDIA.

Balance Sheet as at 31st December, 1913.

LIABILITIES.	Rs.	A.	P.	Rs.	A.	P.
Capital Account—						
Balance of last year's account	..	..	..	10,335	0	0
Add—						
Entrance Fees of—						
14 Ordinary Members @ Rs. 30	420	0	0	..	..	..
2 Associate ,, ,, 15	30	0	0	..	..	..
2 Associates ,, 30	60	0	0	..	..	..
				510	0	0
				10,845	0	0
Reserve Account—						
28 Life Members paid in advance	..	..	..	1,706	10	8
Sundry Liabilities	..	..	..	1,689	10	3
Subscriptions paid in advance	..	..	..	810	0	0
Suspense	..	..	..	26	8	0
Indian Mining and Geological Club	..	..	..	7	8	0
Provident Fund	..	..	..	245	8	0
Library Deposit Fees from Members	..	..	..	10	0	0
Revenue Account—						
Balance as at 1st January, 1913	21,454	5	1	..	..	..
Subscriptions for 1911 and 1912 recovered	30	0	0	..	..	..
Add surplus during the year	1,288	13	10	..	..	..
				22,773	2	11
TOTAL, Rs.	..	..	..	38,113	15	10

ASSETS.				Rs.	A.	P.	Rs	A.	P.
Value of Publications in Stock—									
As per last Account				445	..	..	..	..	..
Added during the year				220	1	9	..	..	..
Less: Depreciation written off				166	4	9			
							498	13	0
Outstanding Bills				..	..	..	546	4	0
Outstanding Subscriptions for 1913				..	..	..	615	0	0
Furniture Account—									
Purchased during the year				589	14	0	..	..	..
Less: Depreciation written off				117	15	0	..	..	..
							471	15	0
Fixed Deposits—									
With the National Bank									
of India, Ld.	22,000	0	0	..	..	..	..	..	..
Interest accrued	323	1	1	22,323	1	1	..	..	..
With the Alliance Bank									
of Simla, Ld.	4,000	0	0	..	..	..	..	..	..
Interest accrued	25	6	9	4,025	6	9	..	..	..
							26,348	7	10
Cash—									
With the National Bank of India, Ld.				9,492	2	7	..	..	..
,, Honorary Secretary				97	12	6	..	..	..
,, ,, ,, Jharia Map Committee				43	8	11	..	..	..
							9,633	8	0
TOTAL, Rs.				..	..	..	38,113	15	10

We hereby certify that we have examined the Books and Accounts of the Mining and Geological Institute of India for the year ended 31st December, 1913, and have found them correct, and that the above Balance Sheet is a full and correct statement of the Liabilities and Assets of the Institute as set forth in the Books.

We also certify that the above Balance Sheet is drawn up in conformity with the law.

Calcutta, 21*st January*, 1914.

LOVELOCK & LEWES, *Chartered Accountants, Auditors.*

MINING AND GEOLOGICAL INSTITUTE OF INDIA.

Income and Expenditure Account for the year ended 31st December, 1913.

Expenditure.	Rs.	A	P	Rs.	A.	P.	Income.	Rs.	A.	P.	Rs.	A	P
Advertising, Printing and Stationery ..	..	..	..	2,747	1	6	Subscriptions—						
Dinner Account	..	..	..	372	10	3	234 Ordinary Members @ Rs. 30 ..	7,020	0	0	..	..	..
Postage and Telegrams	..	..	..	391	0	6	1 ,, Member ,, 20 ..	20	0	0	..	..	..
Raniganj Coalfield Geological Map Account	..	..	..	338	0	0	1 ,, ,, ,, 15 ..	15	0	0	..	..	..
Jharia Coalfield Geological Map Account	..	..	..	1,251	1	6	16 Associate Members ,, 15 ..	240	0	0	..	..	..
Charges General	..	..	..	605	14	6	8 Associates ,, 30 ..	240	0	0	..	..	..
Establishment	..	..	..	1,374	10	9	25 Subscribers	633	5	4	8,168	5	4
Rent	..	..	..	974	0	0	Interest	..	..	..	1,243	3	0
Binding of Books	..	..	..	90	6	0	Advertisement and Sale of Books ..	..	..	..	636	7	3
Subscriptions for 1912 written off ..	..	..	..	285	0	0							
Outstanding Bills written off ..	..	..	..	45	1	0							
Depreciation written off Books ..	..	..	..	166	4	9							
,, ,, Furniture ..	..	..	..	117	15	0							
Balance carried to Balance Sheet ..	..	..	..	1,288	13	10							
TOTAL, Rs. ..	..	..	..	10,047	15	7	TOTAL, Rs. ..	..	..	..	10,047	15	7

Examined and found correct.

Calcutta, 21st January, 1914.

LOVELOCK & LEWES, *Chartered Accountants, Auditors.*

The Chairman: As the Honorary Treasurer, Mr. Hayden, is unavoidably absent and we have all the Accounts before us, I would simply ask the Honorary Secretary to read Mr. Hayden's note on the Accounts.

The Honorary Secretary read the following note by Mr. Hayden:—

There was a considerable increase in cost of producing the Transactions, owing to the large size and number of plates; this, however, is an item which varies from year to year and is capable of control, so that increases under this head are not indicative of any lack of financial stability.

There has also been an increase in the charges paid on account of the preparation and reproduction of the Raniganj and Jharia maps, but this must be regarded merely as an investment, and it is hoped that the new year will see these charges more than recouped by the sale of maps.

There has also been an increase on the debit side owing to the amount written off on account of depreciation of furniture.

Each year we have to write off as bad debts a number of subscriptions due to the Institute from members who have failed to pay. During the year the number written off is 10 as against 9 in the previous year.

In spite of these increases in expenditure, some of which is really only apparent, the financial position of the Institute is thoroughly sound.

The Chairman: I propose that the Report as read and the Accounts as put before you be passed and adopted.

Mr. R. J. Browne: I beg to second that.

The motion was put and carried unanimously.

The Chairman: I will now ask Mr. S. Heslop to open the Prize Committee's award.

Mr. S. Heslop: Mr. President and Gentlemen, it gives me very great pleasure to have to read the Report of the Judging Committee on papers for the Prize during 1913.

REPORT OF A MEETING OF THE JUDGING COMMITTEE ON PAPERS RECEIVED DURING THE YEAR 1913.

Members:—Messrs. G. F. Adams, H. G. Graves, H. H. Hayden, S. Heslop and E. H. Roberton.

Present:—Messrs. H. G. Graves, S. Heslop and E. H. Roberton.

Of the papers submitted the Committee decided that the Government prize should be awarded to Mr. E. S. Tarlton for his paper on "Transport and Screening of Coal at Saltore Colliery." They regret that the competition for the prize was not as great during the past year as hitherto, and would draw the special attention of the members of the Institute to the fact that the prize is available for competition yearly, trusting that a considerable number of papers will be presented during the forthcoming year.

(Signed) H. G. GRAVES.
(,,) S. HESLOP.
(,,) E. H. ROBERTON.

The following members who were unable to be present at the meeting concur in the award.

(Signed) G. F. ADAMS.
(,,) H. H. HAYDEN.

The Honorary Secretary: I am instructed to inform you that the Council have decided to offer three prizes of the value of Rs. 100 each, consisting of books, for the best paper in each of the following subjects:—

(*a*) Laying out a pit bottom for an Indian colliery;
(*b*) Housing and sanitation of mine labour in India;
and (*c*) the application of the various systems of haulage to Indian mines.

The Chairman called on the Honorary Secretary to report the result of the voting for the Council, which was read as follows:—

President.

F. J. Agabeg, A.M.I.C.E., General Manager, Apcar & Co'.s Collieries.

Vice-Presidents.

W. H. Phillips, M.I.M.E., F.G.S., Manager, Bikanir State Mines.
Lieut.-Col. F. Cunynghame Hughes, M.I.M.M., F.C.S., Deputy Assay Master, His Majesty's Assay Office, Calcutta.

Honorary Treasurer and Editor of Transactions.

H. H. Hayden, C.I.E., D.SC., F.G.S., Director, Geological Survey of India.

Honorary Secretary.

H. H. Reynolds, M.I.E.E., Consulting Engineer.

Members of Council

A. C. Bannerjee, M.A., Messrs. A. C. Bannerjee & Co.
R. Barrowman, Manager, Standard Coal Co., Ld.
E. S. Bennertz, General Manager, Kusunda and Nyadee Collieries, Civil Engineer.
P. Brühl, M.I.E.E., Registrar, Calcutta University.
H. D. Coggan, Manager, Central India Mining Co., Ld.
Glen George, B.SC., A.M.I.C.E., Chief Mining Engineer, Bengal Coal Co.
W. J. Greener, Messrs. Bird & Co.
J. S. Kean, General Manager, Raniganj Coal Association.
G. C. Leach, M.I.M.E., A.I.E.E., Inspector of Mines in India.
Hon'ble Mr. W. A. Lee, Messrs. W. A. Lee & Co.
C. H. McCale, Manager, Damuda Coal Co., Ld.
C. S. Middlemiss, B.A. (Cantab), F.G.S., Superintendent, Geological Survey of India.
R. Mitchell, Manager, Adjai Coal Company.
F. Owen, Superintendent, Equitable Coal Co., Ld.
C. H. Richards, M.I.M.M., Superintendent, Nundydroog Mine.

Ex-Officio Additional Members.

G. F. Adams, Sir R. P Ashton, Kt., H. G. Graves. A.R.S.M., S. Heslop, F.G.S., Sir T. H. Holland, K.C.I.E., D.SC., F.R.S., A.R.C.S., W. Miller and A. S. Thomson.

The Chairman: I have much pleasure in declaring Mr. F. J. Agabeg duly elected as President of the Institute for the forthcoming year. I congratulate him on the honour conferred on him, and I trust that he will have the support of the members in every way. I should like to say just a word about the paucity of the papers and the difficulty in getting them. Perhaps we have been to blame for allowing the papers to extend over too wide a range, and I hope what the Council have decided to do in giving these prizes will help greatly towards the contribution of papers to the Institute. I now ask Mr. Agabeg to take the Chair.

The newly elected President then took the Chair.

Mr. F. Owen proposed a vote of thanks to the retiring President and Council for the past year. This was seconded by Mr. R. Purdie and was carried unanimously.

Mr. A. S. Thomson: I beg to thank you for the cordial vote of thanks you have accorded to the Council and myself for the work done during the past year.

The President then read the following address:—

Presidential Address.

BY

Frank J. Agabeg, J.P., A.M. Inst. C.E.

Gentlemen,—I beg to tender you my cordial thanks for having done me the honour of electing me to the Presidential Chair for the coming year.

Before addressing you this morning I stand to-day the oldest Mining Engineer but one in Bengal, having commenced my mining career as far back as 1876.

Many tons of coal have been extracted and burnt from the Bengal Coalfields since those far-off days; many changes have taken place, and many men then known to me have joined the great majority.

I must now ask you, Gentlemen, to go back 38 years, and I shall endeavour to give you an insight into the state of affairs then existing in the Bengal Coalfields.

In his Presidential address Mr. Heslop, one of your past Presidents, stated that in 1872 the field was worked by only five companies, namely—The Bengal, Raniganj Coal Association, Equitable, Barakar and Beerbhoom, together with a number of small and native-owned collieries. He omitted to mention one private concern—a concern that had worked coal many years previous to 1872, and a firm that has played an important part in the development and advancement of the Industry. This firm, it is needless for me to say, is Messrs. Apcar & Co., whose General Manager I have the honour to be.

They have been associated with mining for nearly 60 years, and I shall during my address show you what an important part they have taken in Bengal Mining.

In 1876 the chord line from Sitarampur to Lakhiserai had been built about three or four years.

Raniganj was the most important town in the district, Asansol was just rising to be a mining centre. Sitarampur was a small station, and Barakar was the terminus of the E. I. Ry., in that direction ; collieries except those worked by the above-mentioned companies were very few and were native owned.

Glancing across the field from the Damuda you would have found little or no development.

Dishergarh had just commenced operations. Sanctoria was in its youth. The output of Sodepur was small. The Equitable at Bamondiah were working a few quarries and shallow pits in the Dishergarh seam. At Lachipur quarry work was also in full swing. Beluri, belonging to the Beerbhoom Coal Coy., was also working with shallow pits. Still further on we came to Sitarampur where the seam now known as Dishergarh, but then known as Sitarampur, was being mined by Apcar & Co., who were the first to sink shafts into it. This firm also had collieries at Raghunathbutty, Ramjibanpur, Borachuck, Fathepur, Narsamuda and Gopalpur.

Further East we came to Dhadka worked by the Beerbhoom Coal Coy. To the N.E. of the field the only two concerns operating were Apcar & Co., and Shib Kisto Daw & Co., at Charanpur and Seebpur respectively. At Barakar the Bengal were working Chanch and Lakdhi, and the Barakar Coal Co., Kumardubi. Apcar & Co. had also been working coal at Kansta beyond the Adjai river and carting it to the Damuda river.

Raniganj was the headquarters of the Bengal Coal Co., and most of their output came from pits in that neighbourhood. The Raniganj Coal Association were developing the Toposi area.

From Raniganj to Asansol, except at Nimcha and Searsole, there were no collieries to be seen.

The Gourangdi field had not been touched. In fact, in 1876 the amount of coal that had already been extracted from the important seams was a negligible quantity and was mostly quarry or shallow pit working. Jharia was not known, and was 30 miles distant from the nearest rail-head.

TRANSPORT.

I can assure you, Gentlemen, although our work in those days was not so exacting as it is at the present time, yet the life of a Colliery Manager then was not a bed of roses. We of those early times had none of the conveniences you all have to-day in transport and efficient appliances.

Collieries distant from the railway had to rely on the bullock-cart for their carriage. Every ton of machinery had to be conveyed across country by what might literally be called brute force.

Can you of the present day who have sidings right up to your pit-heads realize the labour it took to take heavy boilers of the Lancashire type, large flywheels and other parts of colliery machinery, for miles over country without roads ?

It is only those, who have experienced this kind of work, know what labour it involved.

The company I have the honour to belong to went so far as to invest in an elephant to enable them to carry machinery from colliery to colliery, and this method proved satisfactory.

That elephant had a tragic end; his bones lie buried on the railway embankment between Borachuck and Sitarampur, having been killed one night by the Down Bombay Mail while returning from a raid on a neighbouring sugar-cane field.

Only those collieries that were on the line of railway were served with sidings, and such sidings had to be paid for in full by the colliery using it. Outlying collieries had to get their coal to the railway the best way they could.

The railway magnates of the time held high court at Jamalpur, and looked upon every colliery and every colliery owner as a nuisance, and the story goes that a certain Railway Official was heard to say that "it would be a very good thing for the E.I.R. if the collieries did not exist, as they were always wanting something."

With a set of Railway Officials indifferent to their own interests in neglecting to increase traffic by transport facilities to the mines, you can understand why development was slow.

None of the existing concerns were willing to lay out capital in opening out new fields, without being assured of cheap transport for their output.

The majority of the large mines were distant from the rail-head, in some cases over six miles, and the only means of communication with the railway was, as I said before, country carts. One would have thought that, smarting under the inconvenience of proper carriage, the then companies would have moved in the matter and forced the hands of the railway authorities, but not a single Company took the initiative.

It was left to private enterprise to be the first to rely upon themselves. Irrespective of the 2′-6″ narrow gauge line of over 5 miles, that Messrs. Apcar & Co. constructed in conjunction with Messrs. Shib Kisto Daw & Co., in 1876, to enable them to make their Charanpur collieries a commercial success, Messrs. Apcar & Co. were the first to lay down at their own expense a broad gauge line from Sitarampur to their Lachipur Colliery. This was in 1881. The success of this undertaking was assured from its opening, as the neighbouring collieries belonging to the Bengal Equitable, and native owners were only too glad to avail themselves of this line for the despatch of their output to Sitarampur, by paying what was then considered a small royalty in comparison to the high rate for cartage. In some cases the saving to them was as much as annas 12 to Re. 1 per ton, and an average of 20,000 tons a month was then carried by this branch of only two miles in length.

With this object-lesson before them, the E. I. Ry. still did not move, and nothing could induce them to accommodate outlying collieries. This short-sighted policy eventually lost them the whole of the traffic that was legitimately theirs in the Dishergarh and Sanctoria areas, and the Bengal Nagpur Railway came in and did what the E.I.R. omitted.

Irrespective of the high cost for cartage to rail-head from distant collieries, the inconveniences and loss to the owners were very great.

During the rains the unmetalled roads were axle deep in mud, bridgeless nullas were full of water, and the carting was held up for days during this season of year.

Every villager through whose village the carts passed, thought they had a right to abstract as much coal as they wanted from off the passing carts for their own use, and the carters levied a small charge for every maund of coal taken. The consequence of this pilfering was, discrepancies between output and despatches for which the Colliery Manager was held responsible. Demurrage was incurred on wagons lying unloaded, as carts at times were scarce or the carters were out on strike.

The above is a brief outline of what we had to put up with in reference to our transport.

EQUIPMENT AND WORKING CONDITION.

I have been asked many times by the present generation, why it was that those in charge of collieries in former years persisted in the habit of sinking shafts every few hundred feet apart, and whether this system was not detrimental to economical working ?

I have also been asked, how it was that wherever an outcrop appeared in any of the numerous nullas, quarries were either opened out in the nulla itself, or a few yards from the bed, and much below the high-water mark of the rainy season ?

I am afraid no satisfactory reply can be given to the latter question.

As regards the former many reasons can be given.

The appliances were primitive. Few, if any, of the workings were laid with underground trams. The prevailing method of raising coal was by buckets operated by a gin on the surface and manipulated by from 24 to 48 women.

This method was slow, and only a very limited output could be obtained from one pit during working hours.

The coal was brought to the pit bottom in baskets by the men or their women, and kept in stacks, each gang appropriating a place to stack coal till their turn came to raise it.

This system entailed double work.

The leads in time became so great, that the men struck for a new shaft closer to their working faces; if this was not complied with, they packed up their goods and chattels and went elsewhere.

The coal being very shallow, one or two extra pits did not entail much expenditure. It was also cheaper to sink for ventilation than erect elaborate ventilating plant. It was only in later years when the mines were managed by trained men that English practice was adopted.

Some of the winding engines then in use would be fit subjects for a museum if they were now available.

I remember one colliery had a small Beam engine that did the combined work of pumping and winding. A pulley from the main shaft of the engine was coupled up by belting to another wheel on the drum shaft. It took three men to run this master-piece. One at the boiler stop valve, one at the engine, and the third man attended the drum and brakes.

Ship's windlasses were a common form of engine for winding.

Nearly all the large concerns had pits worked by gins, and their remains can be seen to-day dotted over the field. The head gears of these gin pits consisted of two brick walls each side of the pit, on which was fitted the wooden frame, that carried the pulley wheels, which were from 2′-6″ to 3′ in diameter.

It was not till the later seventies that a new era dawned on the Industry.

The important collieries were put under the charge of good men who had had long home experience, and they very soon put a different aspect on the state of affairs and before long old-fashioned methods gradually disappeared.

The tools in use were as crude as the winding arrangements. The pick consisted of a slightly curved bit of iron tipped with steel and was single headed and badly balanced. The handle was round and roughly made of green tough wood. The wedges were shapeless piece of any kind of old iron forged up. The hammers were likewise. The crowbar was one inch round iron 4′-6″ long.

No lamps were used: the miners' lights consisted of narrow strips of cloth, twisted rope fashion and saturated in castor oil. Some of these strips were many feet in length, and you could generally judge how much work a man intended to do that day by observing his bundle of oiled rags.

It was about 1878 that the tin lamp now still in use came into vogue. The oil burnt in them was thin mineral oil from Burma that smoked badly. Kerosine came into use much later.

No daily reports were kept of the condition of the workings, the Manager relying on the report of the underground Sirdars. Very few collieries kept up plans to date, or otherwise.

The average price paid to the miners was a pice a maund and the bucket contained seven maunds. The wages of surface coolies was 2 annas per day; the women received 5 pice and the children 3 pice per diem. The pay of enginemen, fitters, and boiler khalasis ranged from Rs. 6 to Rs. 12 per month, and the colliery chaprasis got the handsome monthly salary of Rs. 5.

There were no direct acting pumps, and all dip water was brought to the Sump by bailers who bailed the water step by step to the main pump standage.

All borings for proving the field were done by hand, and a boring anything over 250 feet was considered a fine performance.

Sinking operations were just as primitive. The explosive used was country powder which gave off volumes of smoke and did very little work for the quantity used. With this poor class of explosive sinking operations were slow and dyke driving was tedious.

I think my company can claim to be one of the first to discard antiquated ideas.

In 1877 or 8 we supplied the whole of our collieries with double-headed steel picks, steel wedges and hammers of the kind still in use. We adopted the direct-acting pump down below and did away with the expensive system of hand bailing. We were also the first to pay the men by weight and erected weighing-machines in all our new pits.

When these improvements were brought into use, the men gave a lot of trouble. They refused to use the double-headed pick, maintaining that the end not in use would prod them in the back. They complained that the nose of the hammer was too small and they could not strike the wedge. Later on they rebelled against the tin lamp, and as for the weighing-machine it was looked upon by them as an invention of the evil one.

Thinking to cheat it, they loaded their tubs hollow in the centre, and piled up on top, and when they were cut for short weight they grumbled. Finding they could not cheat the machine they went to the other extreme of overloading. But when they found they were paid for the extra weight we had no further trouble.

We were not the only company that had to put up with strikes and opposition. The same thing occurred at every colliery, when old ideas were abandoned and new methods adopted.

The boilers in general use were either egg or flat ended. Those of Lancashire and Cornish type, with a few tubular ones, were just coming into use. The vertical boiler was not known at that time, and made its first appearance about 1885.

In 1879 powder was first used by us for blasting down the coal, and the whole output of one mine was obtained solely by this method. Artificial ventilation had to be resorted to, and I had the pleasure of building the first ventilating furnace, which was in daily use till the pit which was 86 feet deep closed down.

Some of you, gentlemen, are of opinion that long wall work in India is the adoption of the present generation. Perhaps you will be surprised if I tell you that as far back as 1874, Messrs. Apcar & Co. adopted this system in one of their collieries, the credit of which is due to my old friend Mr. William Forster, who was also the first to erect screens. The long wall system worked well, and the daily output from the pit in which it was carried on increased.

I do not think it will be out of place to give a slight description of the equipment of this pit, as it will give an idea what a change for the better was being introduced in colliery plant.

This pit was sunk to the Raghunathbutty seam, 4′-3″ thick, the depth was 175 ft., and the diameter 14 ft. It was fitted with cages running between wooden guides; the receiving frames were also of wood, on which four automatic gates operated. The head gear was made of teak 35′ high to the pulley axle, the pulleys being 7′-6″ in diameter.

The winding engine consisted of a pair of horizontal cylinders 12″ × 24″ geared to 2½ to 1 to a drum 7′-0″ diameter. Both steam and foot brakes were fitted and also a winding indicator.

Steam was supplied by two Lancashire boilers of 60 H.P. each.

The pumping plant consisted of 2 sets of lift pumps, 8 inches by 4 ft. srtoke, driven by a horizontal single cylinder engine that was supplied with steam from a separate boiler. Each cage carried two 10 cwt. tubs in tandem.

The coal from this shaft was conveyed to the depôt, a distance of a mile, by a 2 ft. gauge line, and hauled by a locomotive built by Messrs. Manning Wardle of Leeds. On arrival at the depôt the loaded tubs were taken up to the tips that were raised 15 ft. above rail level by an engine, and shot from the tips on to the screens and thence in to the railway trucks. The whole of the plant at the pit was housed in large airy engine and boiler rooms, and the equipment was far superior to many of the present day.

The Indian miner in former years was as independent and indolent as he is to-day, and 40 years of mining has not changed him or his habits.

He worked when he liked and skulked when he liked, and was always ready for any paltry excuse to stop work, and refused to resume until some imaginary grievance or other was rectified.

He observed the same pujas, and demanded the same advances which he always forgot to repay. During the rains he became a cultivator. Mining to him was of secondary consideration. The engine men and boiler khalasis were as bad and worse than they are to-day, burnt furnaces were common, and the man responsible was never to be found.

We had to be just as careful in dealing with labour then as now, as living was cheap and good money was earned.

Rice sold at from 25 to 30 seers per rupee, lentils at about 16 seers. Twenty-four to twenty-five fowls could be purchased for the same amount, and goats and sheep ran from 12 annas to Rs. 2-8 each.

We had the same periodic cholera epidemics that in some cases wiped out whole dowrahs. There was no European medical attendance, and both Europeans and natives had to get medical aid the best way they could. Except the Grand Trunk Road, other roads were bad, and most of the managers rode from colliery to colliery to their work. To write fully of those days would take pages.

PRESENT CONDITIONS AND DEVELOPMENT.

There can be no question that it was from the time the rules in regard to Assisted Sidings came into force, that an impetus was given to development.

These rules were not a day too soon. Trade was expanding in all parts of the country. New lines were being constructed or completed. Mills were springing up in every Province, and the Shipping at the several ports was increasing by leaps and bounds.

All these undertakings required cheap fuel, and it was for India to supply their wants.

Many collieries began to open out. Areas that had remained dormant were exploited, and the completion of the railway from Sitarampur to Jharia brought into operation an untouched field with great possibilities. In fact from the middle nineties there was no Industry that received such attention from capitalists as coal.

Each year saw new Companies added to the existing list. Every bit of country that contained any kind of the mineral was greedily sought after by speculators, and the owners of property did a flourishing business in leasing out their Mining Rights on Royalties.

Exhorbitant earnest money and prices were demanded and very often obtained for land.

The field was overrun by a heterogeneous class of speculators, European and Native. The Legal Profession also reaped in a rich harvest, as the local courts were full of litigants, and issues as to the proprietorship of minerals arose, that had never been questioned before.

With this rapid development, both in the Raniganj and Jharia fields, labour for the mines became scarce, and the consequence was that wages went up to an alarming extent.

Coolies that could have been had for 2 annas a day demanded anything up to 8 annas, and in proportion extra wages had to be paid for female labour. The prices of commodities also rose.

Since 1882 the Government of India had been urged by Home influence, and the phillipics of Messrs. Medlicott and Ness, who saw nothing good in coal mining as practised then. They decided that the time had arrived to enforce some kind of legislation, and it is to the credit of those responsible, that the Mines Act of 1901 was drawn up in the manner it was. That Act while being efficient, yet was tempered to suit the conditions appertaining to Indian Mining, without hindering its development by vexatious clauses.

The thanks of the Mining Companies for this act of grace are due to the successive Lieutenant-Governors of Bengal and their advisors during whose regime the Act was under consideration.

To satisfy himself as to the actual state of affairs, the late Sir John Woodburn, and later Sir Andrew Fraser, visited the coal fields, and I had the honour of conducting them round during their respective visits.

Lord Curzon, who was Viceroy at the time, also interested himself and visited the Jharia Field—went below and obtained valuable information by personal observation and questioning the men on the spot.

I feel sure I am voicing the general opinion, when I state that not one of us complain that the Act has been administered fairly though firmly by the officials whose duty it is to do so.

By the passing of the Mines Act of 1901 the certificate of competency came into force. This was a move in the right direction, as it gave a standing to the profession in India it never had before. By this Act no one is eligible to manage a mine unless he has passed the prescribed examination, or holds the certificate of service given only to those who had prior to its introduction held full charge of a colliery for over five years.

The abnormal development at the time caused a dearth of administrative officers, and as a sufficient number of local men with the necessary qualifications were not available, men had to be appointed from home to supply requirements.

To meet the future wants of the Industry, the Government appointed Lecturers who hold Mining Classes at the different important centres, and give facilities to those wishing to sit for certificates of competency.

The classes, I am informed, are well attended, and great interest is taken in them by the students; and it is from the knowledge obtained at these classes, that a number of Indian-trained men have been able to obtain certificates.

While the Government was doing its duty in safeguarding the Industry and encouraging the advancement of mining knowledge, what were the Companies doing towards economical working and proficiency? Were they discarding the antiquated ideas and methods that formerly existed or were they marking time?

You of to-day have had the benefit of 40 years of advancement: in Science, Engineering, and Invention. You have at your disposal forces and facilities that we pioneers never dreamt of. You have also been able to profit by the mistakes made by us, early workers.

Have you taken full advantage of this?

Have you steered clear of the shoals of ignorance and blunders of those days? These are the questions before us?

May I answer them for you? In a number of instances you have kept up with the times and have succeeded well. Yet there are still many carrying on much in the same primitive manner as obtained nearly half a century ago.

Coal is not a cereal that is sown and reaped yearly. Once extracted it can never be replaced in the lifetime of a world.

Therefore it behoves us all to mine and consume it with the strictest efficiency and economy. How many of us are doing this at the present? I am afraid, very few.

The amount of waste that still goes on in mining is deplorable; and it is to you of the present generation, equipped as you are with all the advantages of modern discoveries and inventions, to do the duty we all owe to posterity and unborn humanity.

Cheap fuel of every description is the life-blood of a nation, and those who can command this, hold the foremost position in commercial and political supremacy.

Two of the most wasteful ways of utilising the mineral in India obtain in the mines.

The first is that hungry coal consumer and abomination, the vertical boiler, that one sees, sometimes in battalions, belching forth smoke and flames. Can anybody be surprised when reviewing the periodical reports of the different companies the absurdly disproportionate amount of coal consumed under the heading "Burnt in Boilers" in comparison to the output? Much of this coal "Burnt in Boilers" could have been saved if a more efficient means had been adopted, and the value of it when sold would have helped towards the building up of a reserve that most of the existing companies sadly need.

The other wasteful method is what is known as Soft Coke Manufacture—a criminal means of utilising coal, as, by it, one ton of volatiles is lost to every three tons of coal mined; and it is difficult to estimate the number of heat units that must be wasted annually in this way.

Nature has done much to damage the finest seams in the field by burning out large areas, and causing incalculable loss, and we should not help her further by our wasteful methods. Leaving out of consideration the Jharia field where acres of coal has been burnt, I wish to refer to two of the most widely known seams that have been affected in the Raniganj series, namely, the Sanctoria and Dishergarh. There appears to be little doubt that the Sanctoria seam from Choto Dhemo to the Solma Dyke is burnt right along the outcrop, and it is to be feared that in this area there will be little or no improvement as we get to the dip. I am informed that to the south-west of Neamutpore village the Sanctoria seam has been bored to a depth of 1500 feet and found to be totally burnt. In regard to the Dishergarh seam, prospects although not all we could wish appear to be very much brighter. You may be interested if I go a little further into the matter and tell you what results have been obtained as far as my own actual knowledge is concerned.

We put down borings to prove the Sanctoria seam at Bhandra where the seam outcrops, and all the shallow borings up to 169 feet showed burnt coal. A deeper one to the south and at the extreme edge of the boundary that was bored to 520 feet showed the same unfortunate results.

To satisfy myself I sank a trial shaft. In this shaft the seam was 6′-6″ thick, and totally burnt. The samples of burnt coal taken from this shaft was the usual kind one finds in the approximity of every dyke. The coal when broken displayed beautiful crystals embedded in it. These crystals were very small and scintillated in the light. A few sent to the Geological Department were pronounced to be quartz.

I next took the Dishergarh seam in hand, at Raghunathbutty. The first boring struck this seam at 169 feet, only 3 feet of the top being burnt and the rest of the seam being clean.

The thickness including the burnt portion was 12 feet. Before striking coal I passed through 3 feet of Mica Peridotite lying directly over the burnt portion.

The next boring was put down further south to a depth of 480 feet, the coal in which was all burnt.

At Gandui the neighbouring property, a boring of about 1000 feet was put down into the seam which also showed the whole to be burnt. This was very discouraging.

A deeper boring was taken in hand by the Sitarampur Coal Company at their Nursamooda Colliery. This boring went to the depth of nearly 1900 feet, and proved the seam to be of excellent quality and no trace of burning, the overlying seams being also intact.

The problem to be solved in the future will be: Up to what depth after 1000 feet does the clean coal commence and how far to the north-east at this depth does the burnt area extend?

I come now to the present conditions of coal Mining as practised in India.

During the last 40 years great strides have been made for the better equipment of the majority of collieries. The best machinery obtainable can be seen at some of the latter-day pits.

We find electricity utilised in a number of ways for lighting, pumping and hauling, and I understand that this power will be utilised for winding at one of the latest concerns. Compressed air has also been introduced for pumping and coal cutting. In sinking you have the advantage of the most powerful explosives: Dynamite and its family. By the use of electricity for shot firing you have turned blasting from a dangerous occupation to a safe and efficient means of doing your work. The Diamond boring machine solves geological riddles that we of an older generation were unable to do with our primitive hand machines, and it has been the means of proving vast areas that had been a sealed book before.

The invention of the internal combustion engine has given you a means of locomotion, that not only saves valuable time, but increases the individual value of your services to those who employ you. It is possible that this new form of developing power may be extended to operations more closely and more directly connected with mining in the near future.

The time is very near when those who control the commercial destiny of the Industry will find sooner or later that the inflated dividends of to-day, without providing for future development, will be detrimental to commercial prosperity.

With the present system of mining, will the Industry be able to keep up with the demands of the future? Even now the scarcity of output means abnormal prices, and while such abnormal prices are beneficial to the few, it is highly detrimental for trade in general. Dear coal is not a healthy condition, and consumers will be drawn to cheaper markets for their fuel. Once this happens, it will be difficult for Indian Coal to regain lost ground.

We have been told that new fields are opening out, the output from which will counterbalance inflated prices. in the old area. But we know very little about these new fields, except that the coal so far proved does not compare favourably with the best seams as worked in the old fields at present.

The most important subject now requiring the attention of all mining men is the question of labour. It is no good having elaborately fitted up pits, equipped with the latest practice of the day, and in charge of the best men available, if you have not sufficient labour to fill the working faces. It is the labour question that will be one of the most serious obstacles in the way of the increase of output.

The cry from every colliery is more labour. Where this extra labour is coming from is hard to say. From latest statistics, it appears that in 1912 the number of persons working in about the mines regulated by the Indian Mines Act was 164,302, of which 103,980 worked underground, and 60,322 on the surface. The Chief

Inspector of Mines in his Annual Report for 1912 says: "'Owing to the new undertakings in the Raneegunge coalfield alluded to in the next section, considerable additions to the present labour force will be required, and considerable difficulty will be experienced in fulfilling these requirements, unless more systematic methods of recruiting than those adopted up to now are employed.''

To get new recruits for mining is very difficult, as it is not every caste that will take kindly to coal cutting.

With the dearth of labour and the difficulty of obtaining it, the only other remedy is better methods of mining.

Those concerns that will make these methods their most important subject, will be in a superior position to give a greater output per man than those who continue to mine on old lines. This is one of the important matters left for you to solve.

An increase of a quarter of a ton per man per day by better mining, would increase in a year the output of a colliery by many thousand tons and thereby reduce the actual cost at the pit-head.

FUTURE PROBLEMS.

As the conditions of mining are changing yearly and deeper working is becoming necessary, investors will have to wait longer for a return on their outlay.

Deep pits take time to equip and develop, and the capital required for them is considerable. The outlay on a pair of shafts 1200 feet will entail a capital outlay of over eight or nine lacs of rupees.

Greater risks and dangers will be met.

So far gas has troubled only a few of us, but it is certain as we get down gas will be one of the evils the Indian Colliery Manager will have to contend with. This will necessitate more efficient ventilation, the universal use of safety lamps and stringent supervision underground.

With a competent administrative staff to meet these altered conditions, what about the miner himself? It is from this class that we shall experience the most trouble.

By the Mines Act of 1901 the Colliery Manager is responsible for the lives of all workmen under his control, and for the safety of his mine.

In England where you not only have an educated administrative staff, but an educated subordinate staff, the responsibility and anxiety of a manager is not nearly so great as the manager of a deep mine in this country.

The easy go-as-you-please method of working shallow pits free from gas will not do in the deeper ones, and unless something is done to educate the miner and bring him in touch with the altered conditions, the responsibilities of the colliery manager will increase fifty-fold.

Even Sardars know nothing of gases and their laws; the danger of coal dust, or the theory of air currents. This class is uneducated, and very few can read and write. To substitute educated men for them would solve the problem, but the educated man would demand more pay and thereby increase expenses.

The only suggestion I can offer is that the men we have must be taught, and it is we who will have to teach them. A mine is for this class the best of all schools of Mines, but, as in every other school, teachers are a necessity.

It has been hinted that Government should legislate in regard to the labour employed, and enforce some law by which the Indian miner will be kept more in hand than he is. This is another delicate subject to handle at the present. If legislation is enforced on the mining labour it will hinder recruiting, give no end of trouble with the men, and leave a loop-hole for any irresponsible agitator who seeks a little cheap notoriety. Legislation of this kind would also necessitate legislation for the employers, and I am of opinion that for the present the Industry has sufficient legislation to ponder over without asking for more.

It would be interesting to know how many persons realize the great changes that are taking place in Indian Mining, and whether proper provision is being made to meet the situation ?

Unless those who guide the destinies of Mining Concerns give this matter thought, they will find themselves severely handicapped in the near future.

The chances thrown away during the last few years for building up large reserves is to be regretted.

Lavish dividends have been declared in order to satisfy the greed of irresponsible speculators, who care not a brass farthing as to the welfare of any concern, so long as they can screw the last anna out of it.

Capital in India is shy, and permanent investors will think twice before risking their money in undertakings the shares of which daily fluctuate to such an extent that they never know what a day may bring forth.

Instead of this uncertainty, the shares of the leading coal companies should stand as good as any gilt-edged security, and ought not to be, as at present, the shuttlecock of every speculating Bazar Bunnia.

I fail to see how those concerns who have no reserve to fall back on will meet the demands necessary for new development, without raising debentures and saddling existing capital with this extra burden. This is however more a matter for the commercial man to wrestle with than for us.

As conditions here get similar to those at Home, the administrative staff will have to be well chosen; only the best men, with extensive experience, must be put at the head of affairs, and they must be trusted.

As the output will depend on a single or double shaft, the laying out of the underground arrangements must be such as to obtain a large output in a given time, and the daily tonnage from these must be considerably more pit for pit than it is at present from the shallow shafts.

Coke manufacture is another subject for future thought. There is no reason why we can not make good coke provided better and more up-to-date ovens are built, and the material carefully selected. If this were done foreign coke would cease to be imported.

Bye-Product plants, I have no doubt, will be established sooner or later. A plant belonging to the E.I.R. Colliery is already at work, giving good results. The demands for bye-product is increasing, and if more plants were put down they would prove a success commercially.

Briquette-making has already been tried in India. In fact Messrs. Apcar & Co. can take the credit for being the first to introduce plant of this kind as far back as 1872. The machine imported by them worked well and turned out good briquettes, but it was before its time and there was little or no demand for this class of fuel then.

Provided the companies mining the field realize the coming changes, I see nothing but clear skies in the future for the Industry.

Trade is increasing yearly. Railways, Mills and other Manufactures are expanding, and all are requiring fuel.

I do not think we need be afraid of oil supplanting coal for general commercial use.

"One swallow does not make a summer," and the fact of the adoption of oil by a few in preference to coal gives no idea to what heights the price of oil would rise, should it come into more general use.

As it is, its price is steadily going up, owing to old areas becoming exhausted and the difficulty of locating new fields.

The responsibility of the Mining Engineer has increased, his position is becoming a higher one, and this Institute, coming into existence at what in my opinion was just the right time, has done much to improve his status.

We must not imagine that the certificate we have received is the *Ultima Thule* of our knowledge, and that it stamps us at once as infallible experts and exponents of our profession.

It takes years of hard work in which many disappointments and failures must be encountered before success is assured.

We belong, gentlemen, to a profession that demands unity of action.

Do we not deal daily with those unseen subtle forces of nature, having laws that once broken are never forgiven, and that overwhelm those breaking them with death and disaster?

We also belong to a profession that can show deeds of heroic self-sacrifice, that grateful women and orphan children alone know of; and deeds if they had been done on the battle-field would have been blazoned forth to every quarter of the globe.

This being so, it behoves us therefore to act up to the best traditions of our calling.

In conclusion I hope you will forgive any shortcomings in my address to you this morning. It has been impossible to go into deeper details on the subjects I have alluded to.

I have purposely avoided dry statistics as these can always be obtained from other sources and most of them you already are acquainted with. I have this morning only endeavoured to give you actual facts, as known to me in my long experience of 38 years of Indian Mining, and suggestions for future thought. I thank you again for electing me to the chair for the coming year. I ask you all to work with me. I ask you to try to make our branch meetings both at Jharia and at Asansol a success. This can only be done by the reading and discussion of papers, and before papers can be read they must be written. I hope no one will think that any subject he is interested in is too small to write about. The shortest introduction is sufficient in many cases to bring about the fullest discussion. If you will all help me, I shall do my best to ensure a successful year, and I hope I shall be able to merit the honour done me by my work in the cause of the Institute during my tenure of office.

Mr. H. G. Graves: Gentlemen: I, like the rest of you I am sure, have listened with the greatest interest possible to the account Mr. Agabeg has given us of the history of mining in Bengal. It is one of the most fascinating subjects because some two score years ago we see how they utilized the services of an elephant, and then the elephant ran away and ate sugarcane and got broken up by a passing train. It is very fascinating to listen to all that, and it is of very material interest when we come to consider the arrangements in the present day. It is not permissible, I suppose, to discuss the President's speech, but I think we must take it as it is given to us, and we must ask Mr. Agabeg to allow us to have the honour of printing it in our *Transactions*. I think we ought to pass a vote of thanks to Mr. Agabeg at the same time.

Mr. J. S. Kean: I have much pleasure in seconding the vote of thanks to Mr. Agabeg for his very interesting address.

The motion was carried unanimously.

The President: I thank you very much for your vote of thanks for my address. I also beg to move a vote of thanks to the Asiatic Society of Bengal for allowing us the use of their rooms. I do not know what we would have done without the use of these rooms, and I thank them for allowing us to utilize their rooms every year for our Annual Meeting. I may here mention that Messrs. Apcar & Co. have extended an invitation to all members of the Institute to visit Charanpur on the 23rd of February. His Excellency the Governor will also be there; he will leave Calcutta on the night of the 22nd, and will arrive at Charanpur on the morning of the 23rd. I shall be pleased to see as many members of the Institute as can find the time to come, and I shall try and do my best to give them an interesting morning. I do not think there is any other business, and the Meeting may now close.

Annual Dinner.

The Annual Dinner was held at the Dalhousie Institute, Calcutta, on Friday, the 30th January, 1914, at 8-15 P.M. Colonel F. J. Agabeg, President, in the Chair. His Excellency the Governor of Bengal was chief guest of the evening. The following members and guests were present:—

Messrs. G. F. Adams, B. Adamson, Thos. Adamson, A. A. Agabeg, E. C. Agabeg, F. J. Agabeg, C T. Ambler, P. H. Ashcroft, M. M. Bear, C. R. Bland, R. J Browne, P. Brühl, H Burkinshaw, R. F. Campbell, G. Cassie, A. T. Creet, H. M. Daly, G Dixon, W. R. Dobermann, N. G. A. Edgley, E. Ezra, A. J. Fraser Blair, Glen George, T. S. Gibson, L Green, W. J. Greener, H. G. Graves, A. Hall, K. A. K. Hallowes, S. Heslop, A. H. Higby, Lt.-Col. F. Cunynghame Hughes, H. F. D. Jacob, L. A. Jacobs, J. H. Jennaway, S. A. Joyce, J. S. Kean, A. Kimber, J. Kirkwood, G. Laird, A. M. Lamb, H. Lancaster, G. C. Leach, Hon'ble W. A. Lee, H. T. Lemon, J. A. Leslie, P. F. Linton, C J. G. Lovebaud, C. E. Low, H. V. Low, C. H. McCale, J. S. McDonald, H. J. McGee, C. McCarthy Jones, A. G. Mackay, J. Mackintosh, S. McMurtrie, F. T. Marley, J. G. Maughan, E. D. Onraet, W. H. Phillips, T. R. Pratt, R. Purdy, T. W. T. Quarmby, W. J. Rees, H H. Reynolds, A. K. Rhoden, A. Russell, T. Samson, E. S. Saunders Chas. E. Simmonds, W. Simmons, H. M. Tarlton, C. Thompson, A. S. Thomson, C. H. R. Thorn, F. Thornton, J. J. Turnbull (Jr.), Thos. Walsh, Alex. H. Ward, J. B. Wardlaw, J. White, W. D. Williams, J. Wyness, T. P. Yeoman.

The guests of the Institute were:—

His Excellency the Governor of Bengal, Col. C. A. R. Browne, W. L. Carey, A. M. Clark, G. C. Godfrey, R. S. Highet H. J. Hilary, W. A. Ironside, Arthur Jones, W. Kirkpatrick, P. Lovett, Hon'ble Mr. P. C. Lyon, J. A. Sandbrook, and P. C. Sheridan.

After the toasts of the "King-Emperor" and of "The Viceroy", the President proposed "The Governor of Bengal" in the following words:—

Your Excellency and Gentlemen,—My pleasant task this evening is to propose the toast of our most popular and respected Governor, Lord Carmichael of Skirling.

His Excellency in honouring us with his presence here to-night, has given another proof of the kindly interest the Government takes in the welfare of our Institute, its objects and aims.

The encouragement we have always received from the highest officers of the State shows that we have a firm friend in the Government.

It is 38 years now since I commenced my Mining career in this country, and during that time the officials I have been associated with, whether in business or pleasure, have always shown us, Mining Engineers, the utmost courtesy and kindness. I can speak with authority, as I am not aware there is any one here to-night who has been so long and so closely connected with the members of the Indian Civil Service in our district as I have.

Irrespective of my dealings as General Manager of Messrs. Apcar & Co., I have for over a decade and half in my capacity as Honorary Magistrate, Member of the District and Local Boards, and lastly as an Officer of the Chota Nagpore Light Horse, been, I should say, in daily communication with them.

As far back as the early eighties Home influence was trying to force a Mines Act on us, an Act that if passed then would have considerably retarded our development; as it was the intention of those who were agitating for such an Act, to have it framed on the same lines as that of the English Mines Regulation Act then in force.

It was to the District Officers of that time that we owe the act of grace of having been left alone.

It was they who reported that the time had not arrived to saddle the Industry with unnecessary restrictions, and it was on their advice that the Government of India refrained from taking action.

It is said that the methods of Government are slow, but I can assure you, gentlemen, that slow as they may be they are always thorough.

Coming to the present Act that was made law in 1901 can you not see in the wording of it the iron hand under the velvet glove? And. as I told you members of the Institute in my address this morning, this Act, though efficient in every way, yet is tempered to suit the conditions appertaining to Indian Mining, without hindering the Industry with vexatious clauses.

Are we not indebted to successive Lieutenant-Governors of Bengal and their advisers for the Act as it stands to-day? In them we were blessed with statesmen who had a thorough knowledge of their subject, and a firm grasp of the conditions prevailing in the country.

I think you will agree with me, that when the present Act came into force, the time had arrived for legislation.

The conditions of Mining had changed, and were further changing so rapidly, and the risks and dangers appertaining to it were becoming so much greater, that legislation had become imperative.

It is we older men in the profession who are able to observe the vast strides in development, and changes that have come over the Industry in later years.

Going are the days of quarries and shallow pits. Gone are the ' Go as you please'' methods that prevailed when I first joined the mines, and Go must the slip-shod and primitive methods of former years.

The present and coming conditions require deep thought, both on the part of the Mining Engineer, and the Commercial man. I say the Mining Engineer, because he will have to face altered conditions in Mining that daily become more and more similar to those appertaining to English practice. And as regards the Commercial man, because he will have to supply increased capital to enable future developments to be undertaken. I earnestly advise those who govern the commercial destiny of the Industry to stiffen their backs against the greed of irresponsible speculators, and build up a reserve to meet the extra demands that will be required in the very near future.

Some of my friends in the profession are hankering for more legislation, but the legislation they are asking for is connected with the labour in the mines.

It has been stated that colliery administrators have no legal hold on their labour under the Indian Mines Act, as worded at present, and there is no law that can be enforced, to hold the labourer to his work.

I think we all agree that the present state of affairs in regard to our labour is far from satisfactory, but the subject is a delicate one and fraught with so many difficulties that it requires very careful handling, and my humble opinion is, that the time has not arrived to interfere with the freedom of the miner.

At present he is a "free lance." He works when he likes, takes a holiday when he thinks he requires it, without even saying "by your leave." Yet with all this he is hard working when he is so inclined His enjoyments and pleasures are simple and his wants few.

I remember many years ago on one occasion when I was underground taking to task a gang of Sonthals who had fallen off considerably for some time in their daily output. On arrival at their working face, I found one man asleep, one playing the flute, while the other two were undercutting and loading respectively. The following conversation took place.

On my asking why their output had fallen off, the gentleman with the flute addressed me as follows:—"Sahib, when you go out for shikar, do you always get game?" I replied in the negative. "Well," said my friend, "it is the same in coal cutting: the beastly coal will not always come down"; and commenced playing his flute again.

This is only one of the many anecdotes I could relate that would convince you of the childishness of our underground labour.

What, Gentlemen, really will give us food for thought shortly, is not so much legislation for our labour, but their education?

The new Technical College that Government propose to establish, will turn out administrative officers for the mines by the score, but what about the rank and file?

It is they who will have to be instructed, and given some knowledge of the dangers and altered conditions taking place daily in their calling.

At Home all grades in a mine are more or less educated, and know right from wrong. But this is not so in India. This will be one of the difficulties that will give the Indian Colliery Manager the greatest anxiety, especially if he is dealing with a fiery mine. The ignorance of one person below may lead to disastrous results, both to life and property.

The word Education to many recalls the word School. There is only one school for the miners, and that is a mine. But, as is the case of every other school the teacher must be there, and more and more will it be necessary in the future for the Colliery Managers and his assistants to be teachers.

There is a movement on at present to form a Colliery Managers' Association similar to the National Colliery Managers' Association at Home.

I have no doubt that coming events require some such organization amongst us.

There is no profession that carries so much individual responsibility as ours, and there is no calling liable to so many pains and penalties.

While sympathizing with the objects and ambitions of the promoters, it will be just as well for me to tell them, that if they want their proposed Association respected and a success, they must proceed cautiously, avoiding friction with the powers that be, and not usurping any of the functions and aims of present Institutions.

Whoever are appointed to be leaders, must be men that already command the respect of the profession, and others connected with the Industry.

If they proceed on these lines, I have no doubt that their aspiration will meet with the success it deserves, and their Association become a recognized power.

I shall now pass on to another subject. It has been the custom lately to criticize the alleged shortcomings of a service, and a body of officials who are closely connected with us—I allude to the officials of the Railways, that serve our coal-fields. As I stand here to-night I hold no brief for them. But this I do know. That in these officials, the public have an efficient and hard-working body, whose labours and difficulties are great, and whose able handling of the coal traffic must command nothing but our admiration.

I know them, and I know their work. I also know under what conditions they have brought their service of the despatch of our mineral to a state of perfection that few Railways in the world could beat.

Have any of you realized the hundreds of sidings that are daily served with waggons, and the regularity of such service? If you have not, procure a Railway map of the coal-fields for yourselves and study it. Observe the number of collieries dotted everywhere, and every one equipped with a siding receiving supplies daily without a hitch.

When you have mastered this map, you will then understand what efficient management there must be to work this intricate organization.

You, who have daily dealings with them, are aware that you receive nothing but courtesy, whether that courtesy is connected with your business or your pleasure.

Here again I speak with authority of 38 years' experience. It ill becomes the companies that put the blame of a bad half year's working on the alleged shortcomings of the Railway Authorities. Those who do this are not playing the game.

Our late President in his speech last year alluded to a subject in which most of us are interested. That is, the state of the roads in the Asansol Subdivision.

I can assure him that if he will exercise his soul with patience he will find a transformation in regard to them during the coming year.

In former years the whole of the roads were under the District Board of Burdwan, except a few directly under the Asansol Local Board. The money allotted by the former was inadequate, and on a representation being made to the Government of Bengal, it was ordered that, in future, we should be granted the full amount of road-cess paid by the colliery owners in the subdivision. The Government also resolved that the Asansol Local Board would have the sole charge and control of their work in the subdivision.

The roads except the Grand Trunk Road, that has now been taken over by the Public Works Department, were transferred to the Asansol Local Board in April last.

Owing to this change, and a misunderstanding between the Asansol Local Board and the District Engineer of Burdwan, as to their respective powers, the work of repair was delayed last season; and it was only very late in the year that we were able to continue operations.

I was asked by the Chairman a month or two back to take up the post of Vice-Chairman of the Asansol Local Board, and this I consented to do, and I can assure you that both the Chairman, Mr. Edgley, our popular Subdivisional Officer at Asansol, and myself are doing our best to bring the roads under our charge up to standard.

The contracts have already been given out for the ensuing year, and each contractor has been carefully selected for his individual work and warned that bad work and scamping will not be tolerated.

We have also an efficient Engineering staff to supervise, and I trust shortly to reduce the tyre bills of the cars belonging to the numerous owners living in the Subdivision, by a better state of affairs.

In conclusion, those, Sir, who will drink your health to-night are a body of men whose lives are strenuous, and whose responsibilities and risks are daily becoming greater.

We belong as you know to a profession fraught with many dangers, and a calling that brings out the finest traits in human nature.

You are acquainted with those awful calamities that from time to time overtake us and our work all the world over.

But few are aware of the individual deeds of heroic self-sacrifice that are then done: deeds that are never blazoned to the world but known only to grateful, sorrowing women and orphans.

We trust that you, Sir, will find time at some future date to visit us at our work, and I can assure you that the reception you will receive will be of the heartiest.

We also hope, Sir, that you will honour our festive board again, and that during the remaining years of your Stewardship of this great Province, the political horizon will be clear, and there will be peace and plenty in the land. I may mention here, Sir, that Messrs. Apcar & Co. will deem it an honour if you will accept the invitation to visit their Charanpur Colliery on any date suitable to you. I have also been instructed by them to extend the invitation to all Members of the Institute.

I shall now ask you, gentlemen, to drink to the health and long life of our popular and respected Governor Lord Carmichael of Skirling, coupled with the Mineral Industries of India.

His Excellency the Governor of Bengal replied, and proposed the toast of "The Mineral Industries of India." His Excellency said:—

Mr. President and Gentlemen,—I thank you for the cordial manner in which you have drunk my health, and I thank you Mr. President for the kind words you used when referring to me.

I was very sorry that I could not accept your kind invitation to dine with you last year—the date clashed with a previously arranged visit to Dacca. The Government of Bengal was, however, well represented on that occasion, and so far as I could gather the relations between your members and their guests were of the most cordial description.

From the very beginning Government officers have enjoyed, and greatly appreciated, your hospitality. The Viceroy himself was your guest two years ago. It seems unnecessary therefore for me to tell you how much importance Government attaches to your Institute, but I cannot help saying how pleased I was, as Governor, to listen to the good chit which you Mr. President give to Government. I think I may safely recommend all globe-trotters, especially if they are collecting information preparatory to writing a book, to visit Colonel Agabeg.

Only a small portion of the mineral wealth of India is found in Bengal, as now constituted. I know many of you desired that the boundaries of the Province should be extended so as to include more of the coal-fields; but as the Viceroy pointed out to you when replying to the toast of his health two years ago, there were great difficulties in the way. Since then Government has carefully considered the representation on the subject, but came to the conclusion that the boundaries of Bengal must be left as they are. You loyally accepted that decision, and I am glad to hear that the difficulties you anticipated in working with two different administrations have not been so great as you thought they might be, and that where they have arisen they have largely been removed by the tact and commonsense of my friend Mr. Adams, the Chief Inspector of Mines. I feel sure too that commonsense will always urge both the local Governments to do their best to prevent any unnecessary friction. The two Governments have been working together in the most friendly way. I hope our friend Sir Charles Bayley is as satisfied with my Government as I am with his in this matter. We have published rules for the Boards of Health in mining settlements which are identical for both areas; we have acted and are acting together in the matter of trying to improve the education and training of mining engineers and we hope to establish a joint school of Mines for Bihar and Orissa together with Bengal. In the Jharia Coal-fields I am glad to know that Sir Charles Bayley's Government is continuing the good work in the matter of water-supplys which the Bengal Government began, and it was a great pleasure to my colleagues and myself to allow our Sanitary Engineer, Mr. Williams, to assist in working out plans and estimates. But although only a small portion of the mineral field is within Bengal, the Province which includes Calcutta must necessarily always be keenly interested in the Mining and Geological Institute.

You bring together in your membership Geologists whose knowledge is so useful in pioneer work; Mining Engineers who make available the mineral resources of India, and the officers of Government who are responsible for the proper administration of the Mining Act; you make it possible for these three classes to meet together not as different classes of officials, but as professional men to discuss openly and frankly their difficulties with each other and determine and form different points of view, to find an answer to the same question how to adapt the great sources of power with which nature has provided this land. for the convenient use of man.

The transactions of your Institute already form a valuable technical library for practical miners in India. Text-books have at all times their value, but they must be supplemented by practical experience. As Colonel Agabeg said just now, the Mine is the real school for miners, but it is well that those who have learned its lessons should write them down and your successors will, I feel sure, be grateful to those who have left a record of the manner in which they have surmounted difficulties in the past. I notice that the Institute, as a body, has paid many visits to Engineering, Mining and kindred works. I thank your President Colonel· Agabeg for asking me to accompany the members when they go to inspect Messrs. Apcar & Co.'s Coal Mines. I have been into many mines of different kinds, and it will interest me much to see an Indian Coal Mine. So I most eagerly accept the invitation. I may say that the Institution has, in the opinion of Government, fully justified its existence. It has already realized the dreams of its founder Mr. Pickering, whose tragic death in the execution of his duty we all deplore, and of its first President Sir Thomas Holland. It deserves the support of all professional men interested in mining in India, and I am sure it has before it a great field of usefulness. I need not dwell on the importance of many of the questions with which it deals, not only those concerned with the direct handling of the minerals, especially of coal, but also with the improvement of the conditions of labour concerning which the Institute has already done so much and the education not only of the officers of the Mines, but also the education of the colliers themselves, the absence of which must - and I was glad to hear you, Sir, dwell on this point—be a serious drawback to profitable working and often even a danger in Mines. I have already referred to the Committee which was appointed, as you know, by the two local Governments to discuss particularly the establishment of a School of Mines, and the expansion and development of the existing system of evening classes in mining at Asansol. The report of that Committee has just been received, and Sir Duncan Macpherson its Chairman told me before he left that the Committee had resolved to recommend the establishment of a School of Mines at Dhanbaid and that a scheme for this has been prepared. The Committee has also framed a scheme for improving the evening classes. These proposals have yet to be considered by the Government of Bengal: the cost of them will be very considerable but you can rely on the sympathetic co-operation in this matter of both Governments. I had an idea that you, Sir, might say some hard things about railway management. I almost suspect that some of your remarks may have come as a pleasant surprise to Mr. Highet, on which I congratulate him. For my own part I was quite prepared to hear some criticism of the facilities for shipping coal. Here in Calcutta these facilities are not such as I would expect the shareholders in some of your companies to gloat over. But since you perhaps out of kindness to me said nothing about them, I need only say I hope the new Committee which began its sittings a few days ago may be able to help us to improve them. Before I give you the toast which I am to propose I would like to add one word on behalf of Government of appreciation of the honorary work done by many of the Mine Managers and their Assistants in the general administration of the Province. In Colonel Agabeg, your President, you have an excellent example. He has given much of his leisure time to act as an Honorary Magistrate and he has given the benefit of his valuable advice and counsel to the different local bodies. If he succeeds—as he told us he will—in lowering the tyre-bill of all those who use motors in his district, I feel sure that there will be many, even of those who do not use motors, who will wish there were more Mine Managers to help in local administration. It may not be out of place too if I refer here to what Colonel Agabeg has done in making the volunteers an effective force. He is not the only mining man who has done this. From what I hear I am inclined to think that mining men are very valuable in a Volunteer Camp.

There was a camp at Purulia about a fortnight ago, in the other province, and I am told that camp would have been a far finer thing had more Asansol men been present at it.

Gentlemen, as I said before, the Institute has certainly justified its existence. I am sure it has a brilliant and useful future before it in promoting the interests of the Mining Industries of India. I confidently look to the same ready assistance being given in the future which is being given in the past to Government by the Mining Association, and by the individual managers and assistants. The enforcements of sanitary rules and precautions, the payment of a cess on coal to enable the carrying out of a system of water-supply and similar things may seem to me as Governor very desirable, to me as a man who has taken a share in industrial work, they also seem to be things which may not always be welcome, and both as a man and as a Governor I thank you for the way in which you have looked at these things, and I assure you your assistance can be most valuable in many matters to several departments of Government, not least to the police, and my gratitude to you is all the greater because I look forward into the future as well as back to the past.

We all wish prosperity to those industries, and to all who are engaged in them. Colonel Agabeg referred to the heroism often shown in Mines. I do not know Indian mines, but I do know mines and miners in other countries, and have personally known many instances of that heroism, and that makes us all the more willing to ask you to drink with all your heart to the Mining Industries of India.

I will couple with the toast of the Mining Industries of India Mr. W. A. Ironside. Before Mr. Ironside replies I have been asked to do two things. One is to make a presentation to Mr. G. C. Leach of Sitarampur of an award of merit for good work in connection with the Ambulance. The other is to give the Government prize to the author of the best paper, Mr. E. S. Tarlton, for his paper on "Transport and Screening of Coal at Saltore Colliery." He is not here, but I am told that his brother will come and take it.

His Excellency then handed the certificate and prize to Messrs. Leach and Tarlton respectively.

Mr. W. A. Ironside then replied on behalf of the Mineral Industries :—

Mr. President, Your Excellency and Gentlemen,—I feel myself but poorly equipped to reply for the Mineral Industries or to adequately express our delight at having His Excellency Lord Carmichael here this evening. I have listened with great pleasure to his kindly sentiments and generous references, and knowing the keen interest he takes in everything connected with Indian Commerce and Industry, I feel, and you will agree with me, that our Governor's expressions are not mere idle words. His Excellency has striven, in the time at his disposal, to see for himself and thereby judge for himself, as far as possible, the conditions and necessities of many outlying portions of the vast territory in his charge, and I am glad to know he is soon to be welcomed in the colliery districts. You will find a warm welcome, Sir, from dirty yet dear old coal. At times we wish it were dearer.

Gentlemen, the toast I am privileged to propose brings to one's memory the many energetic and fearless workers who have forced the Industry on to such magnificent development. Such, for instance, are officers of the Geological Survey of India. What sterling work as pioneers they did so many years ago under adverse and indeed hostile conditions of which to-day we have no adequate conception—and coming to recent times, gallant Pickering, whose great ability, personality and unstinted labour did so much for the Industry he served so well; and, incidentally, how much we owe him for having cemented the bonds of unity which now exists between the Inspectors of Mines and you practical Mining men!

One would like to see collected some graphic records of these old pioneers and former leaders in Indian Mining to remain as archives in the Central Hall of the proposed School of Mines so that the younger generations may be taught to appreciate the splendid foundation of a heritage now devolving to them.

Of all the treasures Mother Earth yields to man's enterprise and energy, Coal will be found to contribute enormously to modern wealth and modern progress. It is often suggested that Coal will be superseded by one of the many forms of amplified and perfected forces of harnessed nature. Water Power is to take the place of the Steam Boiler and Engine, Oil is to displace Coal in the generation of Heat and Power. Gentlemen, competition is an incentive to genius. Steam power production has in the past 20 years passed at bewildering speed from the old compound and triple expansion slow-speed Engines, which only a few years since were viewed as the last word in cheap and effective power production. Now the steam Turbine has provided coefficients of efficiency and reliability which are a regularly recurring cause of perplexity to the Industrial owner who has to select means for meeting the advance and progress occurring in his own particular trade.

But Coal is, and always must be, the most reliable source of motive power of practically all modern industry, and though our wealthy, and let's whisper it, autocratic friends, the Railway, the Shipowners, the Jute and Cotton Mills, are apt at times to look down on our naturally dirty product, yet we and they know they cannot do without it, and the provision of this cheap fuel has undoubtedly led to the expansion of our Industries, and as a consequence provided well-paid labour for a vast number of people, to an extent indeed which our predecessors of twenty years ago could little foresee.

Nor, Gentlemen, have we seen the last of Coal. Modern Calcutta Jute Mills are generating their power at a cost which in Electrical units only something under ¼ of an anna per British Board of Trade unit could beat; moreover we do not fear Hydraulic power, even that provided by that splendidly enterprising firm in Bombay; modern Steam Power can be and will be provided in Bombay from Indian Coal on equal if not better terms ere long. But do not let it be said that the Coal Industry of Bengal and Behar lags behind; the next step must come from our end; it is up to you mining men to suggest the methods, and it is for the mercantile men of Calcutta to provide the means.

And our business must also continue to expand; our suggestions to the Imperial Government and to the Railways during the past two years have borne fruit, and we must acknowledge that the recent efforts of the Railway Board and of the East Indian and Bengal-Nagpur Railways at least show a desire to answer the demands made upon them for regular unrestricted transport.

At this stage I would allude to that sore difficulty we have with the Railway Traffic Departments. I refer to the overloading of Coal wagons. This subject was, as you know, enquired into a year ago, and a *modus vivendi* arrived at which, it was hoped, would bring about an end of the trouble. I regret to say things are almost as bad as ever, and I fear the Indian Mining Association can do no more—the rules of

Railway working are as the laws of the Medes and Persians. This matter calls for your earnest personal interest and attention to find a solution for the trouble.

A commission is now sitting in order to find methods and means for improving the Port of Calcutta. This is a matter, the importance of which only those engaged in the shipment of Coal can properly appreciate. Only we know the endless anxiety connected with the work; and few apparently appreciate the magnitude of the interests involved. Calcutta handles more Coal for water transport than any British Port with but four exceptions; we handle more and, in some cases, much more than Glasgow, Swansea, Methill, Hartlepool, Hull, Grangemouth or Grimsby, etc., and those of you here with personal aquaintance of these places can appreciate the economic value of our present Coal Docks with their very inadequate facilities.

A Colliery Manager in India, like every Industrial leader nowadays, has to be capable of a combination of numerous duties and virtues—Zemindary, Medicine, Sanitation and Buildings, besides the prime duty of being a careful Mining Engineer. Do not think that we mercantile men fail to appreciate this fact; your interests and ours are inseparable, and your difficulties are lightened, I assure you, as far as the money at our disposal renders this possible.

Progress and improvement are in evidence all round us. Government has lately brought into force the Mining Settlements Act, which includes a Board of Health for the Colliery areas of each province. It is welcomed by every one as a means for centralizing expenditure and work, the lack of which has hitherto rendered fruitless so much individual effort towards improvement.

The Jharia Water Supply Scheme will also materialize, and though we have not all looked at it from quite the same standpoint, yet we are one in hoping it will lead to lasting good and to a genuine betterment of the conditions of the people we employ. Further, many of us have or are undertaking the provision of improved medical attention by the provision of more Doctors, Colliery Hospitals and Dispensaries.

Jharia will, at no distant date, have a complete Telephone Service, and this I feel sure will prove so useful that the Raniganj field must follow suit, and later the field will be linked to Calcutta.

That splendid worker, Col. Leonard Rogers, is now perfecting a scheme for the establishment of a School of Tropical Medicine in Calcutta. We wish him every success, and may he experience no delay in the provision of the necessary funds to carry out his plans: it merits the earnest support of Government, the Public, and Industrial employers in this country.

We would like to see the rising generation afforded greater opportunities for Mining Education. A School of Mines and scheme of Evening Technical Classes on an enlarged scale have been enquired into and proposals have, as a result of the proceedings by a Special Committee, been formulated and will in a few days be forwarded to Government. The time will come when every one employed must be better educated and equipped, when it will no longer be possible to depend on one or two men at each Colliery for the proper protection of the great interests involved. Here again let us trust Government will not stint the expenditure.

The future will bring with it greater responsibilities for the practical mining man. We endeavour, as far as possible, to avoid unavailing conflict with the uncontrollable forces of nature; unfortunately in Mining this is not always possible, and fire and flood have recently taken their toll at some of our finest concerns. Our Chief Inspector of Mines, our friend Mr. Adams, will probably call on you for increased care and skill, and you will not be found wanting I am sure.

Forgive me for occupying so much of your time—a speech of this description is a poor after-dinner tonic, but my dose to you is over now, and in conclusion I would adopt a peculiarly apt motto for our Coal Industry by referring you to Louis Stevenson's advice—" The ways of conquest are easy: we have to toil awhile, endure awhile, believe always and never turn back."

Mr. H. G. Graves proposed the toast of "The Guests." He said :—

Mr. President, Your Excellency and Gentlemen,—The toast that has fallen to me to propose this evening is that of our guests. I hope it will give you great pleasure to drink the toast that I propose. We have many guests here to-night. We have representatives here as guests to-night of the Government of India and the Government of Bengal, representatives of the three great Railways that come into Calcutta, representatives of the Port, and representatives of many other institutions with which we are closely connected. All our members and all our guests come here to enjoy each other's company. We enjoy their company, and I hope they enjoy ours. I don't know whether they do actually enjoy our company, but I think they do. Among others I see my friend Colonel Browne who is, I believe, providing at Government expense a special train to convey us to Sara to-morrow. I propose to couple with this toast the name of the Hon. Mr. P. C. Lyon. Many hundreds and thousands of years ago some prehistoric creature flew over the land when coal was being laid down and it picked up any unconsidered trifles it could. Now we have Mr. Lyon coming among us and he flies over the land in the railway and looks after what he can get. He examines the children of coolies for educational purposes, he examines any unconsidered trifles he can get together, but he returns educated children or hopes to do so, and he also returns the revenue he collects in the way of roads and other benefits for the country. I hope that you will consider Mr. Lyon's returns are greater than the amount he collects from us, and that you will drink the health of our guests coupled with the name of Mr. Lyon.

In replying for the guests the Hon. Mr. P. C. Lyon said:—

Colonel Agabeg and Gentlemen,—On behalf of all the guests this evening I return to you our very cordial thanks for the kindly way in which you have drunk this toast, and also to Mr. Graves for the kind words in which he has proposed it. Mr. Graves reminds me somewhat in his remarks of a friend of mine who not long ago was called upon to inspect a Battery of Royal Artillery. He was taken round the stable and shown all the horses in the stable and when he came to the end of them he found that he was expected to say something. He did not know anything about horses, but he thought he could hit on an apt praise and he pronounced them a good level lot. Mr. Graves in dealing with a subject such as this has a great many difficulties to contend with. It was only the other day when I was asked to be a guest at a dinner of a well-known Service in Calcutta that the evening before I was called up on the telephone and heard at the other end of it the agitated voice of a gentleman who said he had to propose the health of the guests the next evening and he wanted to know if my father or my uncles or my cousins had ever been a member—any one of them—of that particular Service. I said that I could not remember at the moment as far as I could recall my family history that any member of it had been a member of that Service. He paid me out the next evening, because when he was going through the list of guests he came to my name and he dismissed it briefly saying that he knew nothing interesting about me. Well I feel that Mr. Graves has done sufficient honour, sufficient justice to the fascinating subject of the merits of your guests and that it becomes the more difficult to deal with that much vaster subject, the merits of our hosts. I am quite sure that when my fellow-guests look at the size of that subject they will be glad to hear that I do not propose to go deeply into it. But I should like to say this much, that we do very much appreciate the opportunity given to us of meeting the members of your Association this evening. We appreciate greatly the value of these meetings, and we realize that these meetings mean a very great deal to our hosts themselves. There are many of you who have come from different parts of India, who are all engaged in the same profession—in the same valuable work of developing and enriching the country—and such meetings as these must be as invaluable to you as they are invaluable to us as members of different branches of the Government in bringing us all together for the common weal. But I will not detain you any longer I will only say one thing, that I think I shall be voicing the wishes and the thoughts that are uppermost in the minds of your guests this evening when I suggest that you having extended to them your kindly invitation to join in your festivities to-night, should do it again.

Mr. A. S. Thomson then proposed the toast of "The President." He said:—

Your Excellency and Gentlemen,—It is a very pleasant duty that I have in proposing the health of our new President. It is also a particularly easy one because it is unnecessary for me to particularize on the qualities of a man so well known to you as Mr. Agabeg. He started his Mining career so long ago as 1876 when most of us hardly knew what a mine was like, even if we were in the land of the living at all.

He has therefore had a long experience in mining and is a leading man in all that is for the interests of the community with which he is most intimately connected. He is a very prominent and energetic Volunteer, Vice-Chairman of the District Board, and he takes the keenest interest in all that is for the welfare of mining.

Those of us who heard his excellent and well-thought-out address this morning can confidently anticipate a very successful year under his presidency.

There is one other matter I must mention, and that is as regards our Honorary Secretary, Mr. Reynolds. The Honorary Secretary is a most invaluable man, and few realize the good work that our Honorary Secretary does for us. I know that he will not reply to this, so I only hope that our President will reply for him.

I now ask you, gentlemen, to drink to the health of the President.

The President in reply said:—

Your Excellency and Gentlemen,—I must thank you for the very kind way in which you have drunk my health. Mr. Thomson has said that I began my mining career in 1876. To most of you Mining Engineers I am well known, but I do not think I am known to most of you commercial men. Although I may not be well known to most of the commercial men, I can assure them that there is no man in the mining industry that has got so much at heart the welfare of the mining engineer as I have.

We must all feel honoured at the way in which our Institute has been recognized by the Government; and I am sure that it is the duty of us now as mining engineers, while looking after our own interests, to support the Government.

As I told you this morning, we do not want a fairer set of Inspectors than we have, and as I told Mr. Adams the other day in my house, that if he ran me in under the Mining Act and had me fined Rs. 100 I would call him in and offer him a drink. We have all got to do our duty, and if at times you think you are hardly dealt with, you must remember that there are certain laws you must abide by, and that if you transgress those laws you must be punished. That, however is not a reason for causing any ill-feeling between the Inspectors and ourselves because they carry out the laws. That is the feeling which every right-minded man has.

As regards our Honorary Secretary, I don't think that any Institute has got a more energetic Honorary Secretary than we have in Mr. Reynolds. How he gets through his work I do not know. He is either arranging papers or dinners or excursions or looking through the names of guests. In fact if the Honorary Secretary of every Institute in India was like Mr. Reynolds, those Institutes would be just as good as our Institute. Now I must ask you to drink to the health of our very worthy Honorary Secretary, Mr. Reynolds.

Mr. H. H. Reynolds said :—

Mr. President, Your Excellency and Gentlemen,—On looking at the programme this evening I do not find any mention of this toast. The work of the Secretary is to look after the Institute, not to make speeches. If I have satisfied you in the past I hope to do so in the future. If this Institute can stop some of the waste in the coal-fields I shall be amply repaid for all my work. Only the other day in my professional capacity I was investigating the consumption of coal in a certain colliery, and I found that the coal used was more than enough to supply power to the whole of the collieries in Bengal. You are all Engineers, and I am an Engineer, and the watchword of engineers is "Progress", so, if you can assist to stop the waste of coal, I shall be pleased to be your Secretary as long as you will put up with me. I thank you all for the very kind way in which you have drunk my health.

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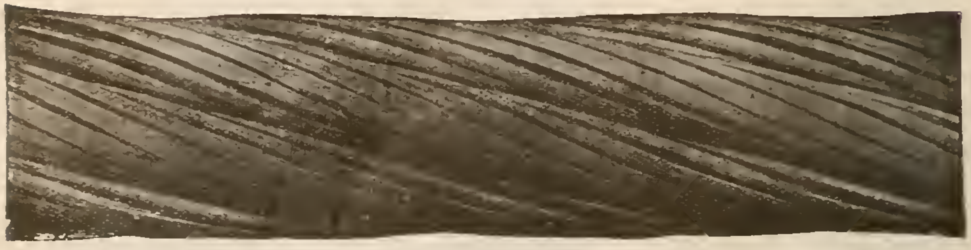

(TESTIMONIAL.)

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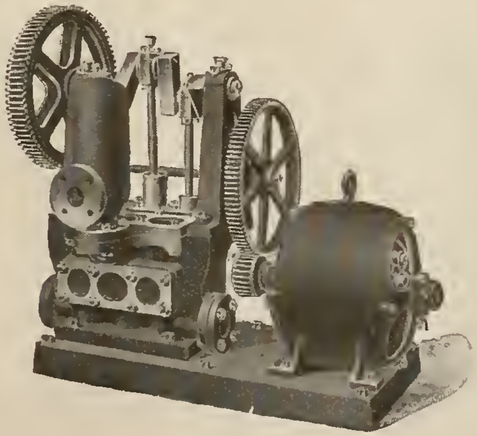

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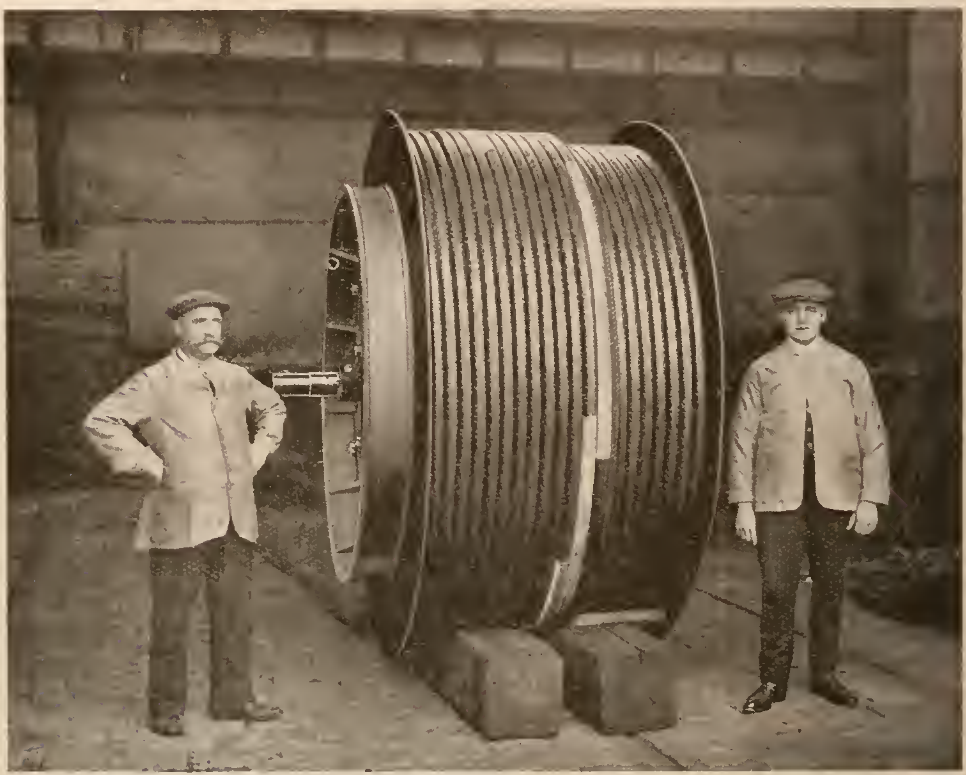

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